

## Reactor Neutrino Working Group – Summary Bullets

Revised February 9th, 2015

### Preamble

**Reactor neutrino experiments play a central role in our understanding of neutrinos and provide a unique tool for discoveries.**

Reactor experiments probe new physics such as sterile neutrinos and neutrino magnetic moments, provide an opportunity to observe coherent neutrino scattering, and advance our understanding of the 3v framework including precision measurements of neutrino mixing and determination of the neutrino mass hierarchy.

### Point 1

**A short-baseline experiment designed to resolve the reactor neutrino anomaly through oscillation and spectral measurements has the potential to discover new physics in a very cost effective manner and is the highest priority of this working group.**

Timely execution is critical. Short-baseline reactor disappearance experiments are complementary to the FNAL short-baseline program focusing on appearance measurements. Given the US experience and facilities, there is an excellent opportunity for the US to host and lead a short-baseline reactor experiment. Proposed projects are ready to proceed and provide an opportunity for world-leading, high-impact science in the next three to five years. They fit the scope and cost of the small-scale program and offer opportunities for international collaboration.

### Point 2

**Medium-baseline experiments plan to determine the neutrino mass hierarchy without the matter effect and precisely measure  $\theta_{12}$ ,  $\Delta m^2_{21}$ , and  $\Delta m^2_{32}$ . Near-term R&D can inform a potential US contribution overseas and ensures US involvement in the determination of the mass hierarchy.**

Such an experiment is complementary to accelerator-based long-baseline experiments and provides critical tests of the three-neutrino framework.

### Point 3

**Measurements of reactor neutrinos are also relevant to the nuclear physics and applied reactor safeguards communities.**

Many of the theoretical and experimental challenges are common across these fields, and reactor neutrino measurements have the potential to uniquely inform these communities.